

## PATENT ABSTRACTS OF JAPAN

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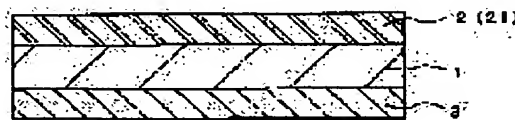
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## (54) THERMAL TRANSFER RECORDING MEDIUM

## (57)Abstract:

PROBLEM TO BE SOLVED: To obtain a clear print even on a recording sheet even if a fusion bondability to an ink image receiving sheet is enhanced and a concentration of a fluorescent pigment in a fluorescent ink layer for forming a thermal transfer ink layer is enhanced by specifying a softening point of the pigment of the layer.

SOLUTION: A thermal transfer ink layer 2 made of a fluorescent pigment and a binder resin is provided on a surface of a base material 1. The layer 2 has a fluorescent ink layer formed of a mixture of the pigment and the binder resin. As the pigment, a mixture of a polymer obtained by emulsion polymerizing it in the presence of a fluorescent dye or a dyed material of the polymer by the fluorescent dye obtained by dyeing the polymer by the dye or an impregnated material is used. A softening point of the polymer contained in the pigment of a range of 5 to 120° C is used. Thus, transferability, sharpness, small part skip, printing density can be improved.



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3.In the drawings, any words are not translated.

**[Claim(s)]**

[Claim 1] Thermal-transfer-recording data medium characterized by softening temperature of a fluorescent pigment of a fluorescence ink layer being 50-120-degreeC in thermal-transfer-recording data medium which comes to form in one field of a base material a hot printing ink layer which has a fluorescence ink layer of hot printing nature containing a fluorescent pigment at least.

[Claim 2] Thermal-transfer-recording data medium according to claim 1 whose content of a fluorescent pigment in a fluorescence ink layer is 20 - 70 % of the weight.

**[Detailed Description of the Invention]**

[0001]

[The technical field to which invention belongs] This invention relates to thermal-transfer-recording data medium for recording an alphabetic character, an image, etc. which have a fluorescence color by the thermal imprint recording method.

[0002]

[Description of the Prior Art] Conventionally, what prepared the thermofusion nature ink layer containing waxes and other additives as the coloring agent which consists of a color and/or a pigment, and a binder on a heat-resistant base material like polyester film as thermal-transfer-recording data medium is known. The printing record method using such a record medium puts a record form on the thermofusion ink stratification plane of data medium, applies a thermal head from a record-medium side, and is performed by carrying out the melting imprint of the ink layer of the portion in the record paper.

[0003] Although monochrome printing of facsimile, a bar code, etc. of these hot printing methods was a center conventionally, the need of the color printer using this method is increasing in recent years. Also especially in this, the need of thermal-transfer-recording data medium is increasing with an ink jet printing method or electrophotography at the point which can reproduce an unreproducible special color, i.e., fluorescence color metallurgy silver etc. Among these, as thermal-transfer-recording

data medium which has a fluorescence color, (A) JP,59-54598,A, (B) JP,63-89384,A, and (C) JP,63-319189,A are known as what added fluorescent dye or a fluorescent pigment in the ink layer.

[0004] At about 10 - 60% of the weight of a fluorescent pigment, the sensible-heat fluorescence transfer medium which hot melt adhesive contains, and (B) in the thermal-ink-transfer-printing ink layer used for a sensible-heat fluorescence record medium at (A) The thermal-ink-transfer-printing record sheet which prepared the heat colliquative ink layer which contains an organic fluorescent pigment and a wax as an indispensable component on the base material is respectively indicated by the fluorescence sensible-heat transfer medium which forms a fluorescence imprint layer through a direct or release agent layer on a base film, and (C).

[Problem(s) to be Solved by the Invention]

[0005] In order for neither to be able to obtain sufficient printing concentration but to obtain sufficient printing concentration, a lot of fluorescent dye and fluorescent pigments needed to be made to contain in an ink layer by thermal-transfer-recording data medium of these former.

[0006] When fluorescent dye was used especially and a lot of fluorescent dye was used in order for a problem to be in the compatibility of the binders (the above-mentioned adhesives etc. are contained.) which form an ink layer and to obtain sufficient printing concentration, the bad influence of fluorescent dye soil a lifting at the time of printing, and it soil a thermal head for bleed out was done, and it became the cause of an abnormality imprint, and also the problem of the water resisting property of a printing object and solvent resistance fall had arisen.

[0007] For this reason, in a hot printing ribbon, it is common to carry out impregnation of these fluorescent dye to resin powder beforehand, and to use it as a fluorescent pigment. However, when a lot of fluorescent pigments were used in order to obtain sufficient printing concentration since these fluorescent pigments did not have the sensitivity over heat, the heat sensitivity of the whole ink layer fell and problems -- sufficient hot printing nature is no longer obtained -- had arisen.

[0008] Moreover, the welding nature to the television paper at the time of ink melting was checked, and the resin to which impregnation of the fluorescent dye is carried out had become the cause of reducing hot printing nature, when there was much what has high softening temperature, and it is about [ 130-140 degrees ] C, and what has low softening temperature added such a pigment so much in the ink layer and manufactured the ink ribbon in consideration of thermal resistance and solvent resistance.

[0009] In view of the problem on \*\*, this invention is made in order to cancel the

above-mentioned conventional defect, the welding nature to ink television paper is raised, and even if it makes high concentration of the fluorescent pigment in an ink layer, it aims at offering thermal-transfer-recording data medium by which clear printing is obtained to a record form.

[0010]

[Means for Solving the Problem] In thermal-transfer-recording data medium by which this invention comes to form in one field of (1) base material a hot printing ink layer which has a fluorescence ink layer of hot printing nature containing a fluorescent pigment at least, a content of a fluorescent pigment in thermal-transfer-recording data medium by which softening temperature of a fluorescent pigment of a fluorescence ink layer is characterized by being 50 - 120-degreeC, and (2) fluorescence ink layer is thermal-transfer-recording data medium given in 20 - (1) which is 70 % of the weight.

[0011]

[Embodiment of the Invention] Hereafter, this invention is explained to details based on a drawing. Drawing 1 is the drawing of longitudinal section showing an example of thermal-transfer-recording data medium of this invention. In this invention, the hot printing ink layer 2 which becomes the surface of a base material 1 from a fluorescent pigment and binder resin is formed, and thermal-transfer-recording data medium is constituted. In addition, the heat-resistant layer 3 which comes to add lubricant, a surfactant, an inorganic particle, an organic particle, a pigment, etc. to binder resin can be formed in the rear face of a base material 1.

[0012] The hot printing ink layer 2 has at least the fluorescence ink layer formed from the mixture of a fluorescent pigment and binder resin. The hot printing ink layer 2 may be formed from two-layer [ of the fluorescence ink layer 21 and the heat adhesion ink layer 22 ], as it may be formed only from the fluorescence ink layer 21 and is shown in drawing 2 . moreover, other than this, the hot printing ink layer 2 is looked like [ two-layer / which was described above as shown in drawing 3 ], and may be formed from three or more layers of the primer layer 23. The primer layer 23 can be formed as a glue line, when preparing as stratum disjunctum for protection of the ink layer after printing and aiming at adhesion of the base material 1 as a protective layer, and an ink layer, in aiming at exfoliation of a base material 1 and an ink layer at the time of printing. Moreover, in the fluorescence ink layer 21, for hue adjustment, organic and an inorganic pigment can be added or a dispersant, a leveling agent, a defoaming agent, an antistatic agent, etc. can be added if needed.

[0013] As a base material 1, the base material film currently conventionally used for the hot printing sheet can be used as it is. You may be the base material which papers, such as plastics, such as polyester, polyethylene, polypropylene, a polycarbonate, an

acetic-acid cellulose, polystyrene, a polyvinyl chloride, a polyvinylidene chloride, nylon, polyimide, polyvinyl alcohol, a fluoro-resin, chlorinated rubber, and an ionomer, a condenser paper, and paraffin paper, cellophane, the acetic-acid cellulose, the nonwoven fabric, etc. were mentioned, and compounded these as an example of the desirable base material 1.

[0014] Although the thickness of a base material 1 can be suitably changed according to a material so that the reinforcement and thermal conductivity may become suitable, it is desirable that it is 2-25 micrometers.

[0015] As a fluorescent pigment, an emulsifier and a stabilizing agent are used in (1) basin system or a non-basin system, and the dyeing object by fluorescent dye or impregnation object of the polymer which dyes the mixture of the polymer and fluorescent dye which are obtained by carrying out an emulsion polymerization under existence of fluorescent dye, or (2) emulsion-polymerization object by fluorescent dye, and is obtained is mentioned. That to which the polymer contained in the fluorescent pigment of (1) and (2) has the softening temperature of this polymer in the range of 50 - 120-degreeC is used. As a pigment containing the polymer in the above-mentioned range, the product "SHINROIHI color FZ-2000 series" made from SHINROIHI, "SHINROIHI color base SP-10 series", etc. are mentioned, for example.

[0016] Although what has the softening temperature of the polymer contained in a fluorescent pigment in the range of 50-120-degreeC is used, since the fluorescent dye contained in a fluorescent pigment does not have softening temperature, the softening temperature of a polymer turns into softening temperature of a fluorescent pigment as it is. What has the softening temperature as a fluorescent pigment in the range of 50-120-degreeC is used by the invention in this application. If problems, such as causing blocking at the time of conservation as the softening temperature of a fluorescent pigment is under 50-degreeC, arise and the softening temperature of a fluorescent pigment exceeds 120-degreeC, the welding nature to the television paper at the time of ink melting will be checked, hot printing nature will be reduced, and problems, such as generating of the void at the time of printing and a skip of details, will arise.

[0017] As a polymer contained in a fluorescent pigment, the following are mentioned, for example. Ethylene-vinyl acetate resin (EVA), an ethylene-acrylic ester copolymer (EEA), A polyethylene, polypropylene, polybutene, polystyrene, and styrene-acrylic nitril copolymer, Petroleum resin, vinyl chloride resin, a vinyl chloride vinyl acetate copolymer, polyvinyl alcohol, Vinylidene chloride resin, methacrylic resin, a polyamide, poly BIRUHORUMARU, A polyvinyl butyral, polyvinyl acetate, a polyisobutylene, polyurethane, an alkyd resin, aromatic series sulfonamide resin, a urea resin, melamine resin, benzoguanamine resin, or polyacetal can be used. What has softening

temperature in the range of 50-120-degreeC among these resin is excellent in the welding nature to the television paper at the time of ink melting, and it excels in hot printing nature.

[0018] In this invention, as for a fluorescent pigment, it is desirable to contain 20 to 70% of the weight in the hot printing ink layer 2, and it is more desirable that it is 30 - 60% of contents. Sufficient printing concentration is not obtained as the content of a fluorescent pigment is 20% or less, and imprint sensitivity falls that it is 70% or more, and sufficient hot printing nature is not obtained.

[0019] as thermofusion nature material, a wax is mentioned and a micro crystallin wax, carnauba wax, paraffin wax, etc. mention as the typical example -- having -- further -- a FISHA Tropsch wax, various low molecular weight polyethylene, haze wax, yellow bees wax, spermaceti wax, IBOTAROU, a wool low, a shellac wax, a candelilla wax, a PETORO lactam, and a polyester wax part -- various waxes, such as a denaturation wax, fatty acid ester, and a fatty-acid amide, can be used.

[0020] These waxes can also be used as an aqueous emulsion, although it can also add as it is. As aqueous data medium used for an aqueous emulsion, it is mixture with water or water, a water-soluble organic solvent, for example, a methanol, ethanol, isopropanol, etc., and a little emulsifier (surfactant) and additives, such as a leveling agent, can be added to these aqueous solvents if needed, and dispersion liquid can be prepared. As for the solid content (waxes) concentration in these dispersion liquid, 10 - 50% of the weight of a thing is used. Furthermore, the derivative of drying oil, resin, mineral oil, a cellulose, and rubber etc. can be mixed and used for the water dispersion of a wax.

[0021] As binder resin, the thermoplastics of the low melting point is mentioned comparatively. For example, EVA resin (EVA), an ethylene-acrylic ester copolymer (EEA), A polyethylene, polypropylene, polybutene, polystyrene, and styrene-acrylic nitril copolymer, Petroleum resin, vinyl chloride resin, a vinyl chloride vinyl acetate copolymer, polyvinyl alcohol, Vinylidene chloride resin, methacrylic resin, a polyamide, a polycarbonate, A fluororesin, the poly BIRUFORU marl, a polyvinyl butyral, acetyl cellulose, nitrocellulose, polyvinyl acetate, a polyisobutylene, ethyl cellulose, polyurethane, or polyacetal can use. The thing of the comparison-low softening temperature currently especially used as sensible-heat adhesives conventionally, for example, 50-80-degreeC, is desirable.

[0022]

[Example] Hereafter, an example and the example of a comparison explain the invention in this application to details. Hereafter, weight criteria show each publication of the section or %.

[0023]

Example 1 Fluorescence pink pigment emulsion (SHINROIHI color base SP-17 and 110 degrees of softening temperatures C, 40% of pure parts)

Section [ 40 / ] Ethyl-Acrylate Emulsion (Toho Chemical Co., Ltd. Make, 25% of Pure Parts) The five sections Carnauba wax emulsion (Konishi make, 40% of pure parts) The 35 sections Paraffin wax emulsion (Konishi make, 40% of pure parts) The 20 sections Surfactant (Sir chlorofluocarbon S-132, Asahi Glass Co., Ltd. make) The 0.13 sections 50% isopropanol aqueous solution After fully carrying out distributed processing of the part for the 30 section above-mentioned presentation using attritor, The film of polyethylene terephthalate with a thickness of 4.5 micrometers was used as the base material film, the above-mentioned fluorescence ink constituent was applied to the field of one of these at a rate of 4.0 g/m<sup>2</sup> (dryness) by the gravure coat method, it dried by 90-degreeC, and the ink layer with the smooth surface was obtained.

[0024] The following fluorescence ink constituent was prepared like example 2 example 1, and the hot printing sheet was obtained like the example 1 using the same base material film as an example 1.

Fluorescence yellow pigment emulsion (SHINROIHI color base SP-15 and 110 degrees of softening temperatures C, 40% of pure parts)

Section [ 40 / ] Ethyl-Acrylate Emulsion (Toho Chemical Co., Ltd. Make, 25% of Pure Parts) Five Sections Carnauba Wax Emulsion (Konishi Make, 40% of Pure Parts) 35 Sections Paraffin Wax Emulsion (Konishi Make, 40% of Pure Parts) 20 Sections Surfactant (Sir Chlorofluocarbon S-132, Asahi Glass Co., Ltd. Make) 0.13 Sections 50% Isopropanol Aqueous Solution 30 Sections

[0025] The following fluorescence ink constituent was prepared like example 3 example 1, and the hot printing sheet was obtained like the example 1 using the same base material film as an example 1.

Fluorescence yellow pigment emulsion (SHINROIHI color base SP-15 and 110 degrees of softening temperatures C, 40% of pure parts)

Section [ 40 / ] Ethyl-Acrylate Emulsion (Toho Chemical Co., Ltd. Make, 25% of Pure Parts) The five sections Cyanine green (FUJI SP GREEN 7188 Fuji coloring matter company make, 30% of pure parts) The two sections Carnauba wax emulsion (Konishi make, 40% of pure parts) The 35 sections Paraffin wax emulsion (Konishi make, 40% of pure parts) The 20 section Surfactant (Sir chlorofluocarbon S-132, Asahi Glass Co., Ltd. make) The 0.13 sections 50% isopropanol aqueous solution The 30 sections [0026] The following fluorescence ink constituent was prepared like example 4 example 1, and the hot printing sheet was obtained like the example 1 using the same base material film as an example 1.

A fluorescence pink pigment emulsion (SHINROIHI color FZ-2007 and 105-110 degrees



of softening temperatures C, 40% of pure parts) The 16 sections Ethyl-acrylate emulsion (Toho Chemical Co., Ltd. make, 25% of pure parts) The five sections Carnauba wax emulsion (Konishi make, 40% of pure parts) The 35 sections Paraffin wax emulsion (Konishi make, 40% of pure parts) The 20 section Surfactant (Sir chlorofluocarbon S-132, Asahi Glass Co., Ltd. make) The 0.13 sections 50% isopropanol aqueous solution The 30 sections [0027] The following fluorescence ink constituent was prepared like example 5 example 1, and the hot printing sheet was obtained like the example 1 using the same base material film as an example 1.

Fluorescence pink pigment emulsion (SHINROIHI color base SP-17 and 110 degrees of softening temperatures C, 40% of pure parts)

Section [ 20 / ] Ethyl-Acrylate Emulsion (Toho Chemical Co., Ltd. Make, 25% of Pure Parts) Five Sections Carnauba Wax Emulsion (Konishi Make, 40% of Pure Parts) 45 Sections Paraffin Wax Emulsion (Konishi Make, 40% of Pure Parts) 30 Sections Surfactant (Sir Chlorofluocarbon S-132, Asahi Glass Co., Ltd. Make) 0.13 Sections 50% Isopropanol Aqueous Solution 30 Sections [0028] The following fluorescence ink constituent was prepared like example 6 example 1, and the hot printing sheet was obtained like the example 1 using the same base material film as an example 1.

Fluorescence pink pigment emulsion (SHINROIHI color base SP-17 and 110 degrees of softening temperatures C, 40% of pure parts)

Section [ 70 / ] Ethyl-Acrylate Emulsion (Toho Chemical Co., Ltd. Make, 25% of Pure Parts) Five Sections Carnauba Wax Emulsion (Konishi Make, 40% of Pure Parts) 15 Sections Paraffin Wax Emulsion (Konishi Make, 40% of Pure Parts) Ten Sections Surfactant (Sir Chlorofluocarbon S-132, Asahi Glass Co., Ltd. Make) 0.13 Sections 50% Isopropanol Aqueous Solution 30 Sections [0029] The following fluorescence ink constituent was prepared like example 7 example 1, and the hot printing sheet was obtained like the example 1 using the same base material film as an example 1.

Fluorescence pink pigment emulsion (SHINROIHI color base SP-17 and 110 degrees of softening temperatures C, 40% of pure parts)

Section [ Ten / ] Ethyl-Acrylate Emulsion (Toho Chemical Co., Ltd. Make, 25% of Pure Parts) Five Sections Carnauba Wax Emulsion (Konishi Make, 40% of Pure Parts) 50 Sections Paraffin Wax Emulsion (Konishi Make, 40% of Pure Parts) 35 Sections Surfactant (Sir Chlorofluocarbon S-132, Asahi Glass Co., Ltd. Make) 0.13 Sections 50% Isopropanol Aqueous Solution 30 Sections [0030] The following fluorescence ink constituent was prepared like example 8 example 1, and the hot printing sheet was obtained like the example 1 using the same base material film as an example 1.

Fluorescence pink pigment emulsion (SHINROIHI color base SP-17 and 110 degrees of softening temperatures C, 40% of pure parts)

Section [ 80 / ] Ethyl-Acrylate Emulsion (Toho Chemical Co., Ltd. Make, 25% of Pure Parts) Five Sections Carnauba Wax Emulsion (Konishi Make, 40% of Pure Parts) Ten Sections Paraffin Wax Emulsion (Konishi Make, 40% of Pure Parts) Five Sections Surfactant (Sir Chlorofluocarbon S-132, Asahi Glass Co., Ltd. Make) 0.13 Sections 50% Isopropanol Aqueous Solution 30 Sections [0031] The following fluorescence ink constituent was prepared like example of comparison 1 example 1, and the hot printing sheet was obtained like the example 1 using the same base material film as an example 1.

Fluorescence pink 130-140 6037 degree pigment of SHINROIHI color base FZ-softening temperatures (C)

Section [ 16 / ] Ethyl-Acrylate Emulsion (Toho Chemical Co., Ltd. Make, 25% of Pure Parts) Five Sections Carnauba Wax Emulsion (Konishi Make, 40% of Pure Parts) 35 Sections Paraffin Wax Emulsion (Konishi Make, 40% of Pure Parts) 20 Sections Surfactant (Sir Chlorofluocarbon S-132, Asahi Glass Co., Ltd. Make) 0.13 Sections 50% Isopropanol Aqueous Solution 30 Sections [0032] The following fluorescence ink constituent was prepared like example of comparison 2 example 1, and the hot printing sheet was obtained like the example 1 using the same base material film as an example 1.

The fluorescence pink pigment emulsion (40% of pure parts [ More than SHINROIHI color FA-47 and 135 degrees of softening temperatures C ]) 16 section Ethyl-acrylate emulsion (Toho Chemical Co., Ltd. make, 25% of pure parts) The five sections Carnauba wax emulsion (Konishi make, 40% of pure parts) The 35 sections Paraffin wax emulsion (Konishi make, 40% of pure parts) The 20 section Surfactant (Sir chlorofluocarbon S-132, Asahi Glass Co., Ltd. make) The 0.13 sections 50% isopropanol aqueous solution The 30 sections [0033] The following fluorescence ink constituent was prepared like example of comparison 3 example 1, and the hot printing sheet was obtained like the example 1 using the same base material film as an example 1.

The fluorescence pink pigment emulsion (prototype, 40 degree [ of softening temperatures C ], 40% of pure parts) 40 section Ethyl-acrylate emulsion (Toho Chemical Co., Ltd. make, 25% of pure parts) The five sections Carnauba wax emulsion (Konishi make, 40% of pure parts) The 35 sections Paraffin wax emulsion (Konishi make, 40% of pure parts) The 20 section Surfactant (Sir chlorofluocarbon S-132, Asahi Glass Co., Ltd. make) The 0.13 sections 50% isopropanol aqueous solution The 30 sections [0034] Printing to art paper was performed for the hot printing ink ribbon obtained as mentioned above using the commercial Label Printer (resolution 300dpi, printing speed 100 mm/sec), printing of solid (imprint nature evaluation) one, 50% halftone (sharpness evaluation), and 1dot length thin line (details skip evaluation) was performed, it judged

further by the error criterion shown below about printing concentration, and the result as shown in a table 1 was obtained.

[0035]

Error criterion 1 imprint nature O : There is no generating of a void. : O The degree which can disregard generating of a void \*\* : Generating of a void is a little conspicuous. x: Generating of a void is conspicuous. 2 sharpness O : There is no generating of Tsubure. : O The degree which can disregard generating of Tsubure \*\* : Generating of Tsubure is a little conspicuous. x: -- generating of Tsubure is conspicuous 3 details skip O: -- there is no omission of a thin line O: -- Degree \*\*: which can disregard the omission of a thin line -- the omission of a thin line is a little conspicuous x: -- the omission of a thin line is conspicuous 4 concentration Relative evaluation was made by making an example 1 into O.

5) Shelf life (50-degreeC, 80%RH, three-day conservation)

O : don't block. x: [0036] to block

[A table 1]

	転写性	シャープネス	細部カスレ	濃 度	保存性
実施例 1	○～◎	◎	○～◎	○	○
実施例 2	○～◎	◎	○～◎	○	○
実施例 3	○～◎	◎	○～◎	○	○
実施例 4	◎	○	◎	○	○
実施例 5	◎	○	◎	△	○
実施例 6	△	◎	△	◎	○
実施例 7	◎	○～△	◎	×	○
実施例 8	×	◎	×	◎	○
比較例 1	△	○	△	○	○
比較例 2	×	○	×	○	○
比較例 3	◎	○	○～◎	○	×

[0037]

[Effect of the Invention] As explained above, since the softening temperature of binder resin is 50-120-degreeC, in thermal-transfer-recording data medium by which thermal-transfer-recording data medium of this invention comes to form in one field of a

base material the hot printing ink layer which consists of a fluorescent pigment and binder resin, thermal-transfer-recording data medium which was excellent in imprint nature, sharpness, a details skip, and printing concentration is obtained.

[0038] Moreover, the alphabetic character and image which have a clear fluorescence color are obtained, without a thermal head becoming dirty since fluorescent dye does not cause bleed out even when thermal-transfer-recording data medium of this invention forms an ink layer, using a fluorescent pigment so much.

[Brief Description of the Drawings]

[Drawing 1] It is the drawing of longitudinal section showing an example of thermal-transfer-recording data medium of this invention.

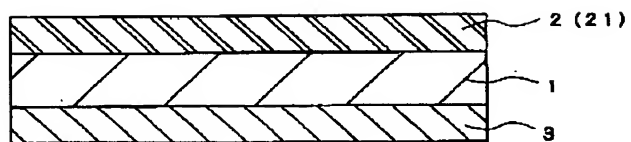
[Drawing 2] It is the drawing of longitudinal section showing another example of thermal-transfer-recording data medium of this invention.

[Drawing 3] It is the drawing of longitudinal section showing still more nearly another example of thermal-transfer-recording data medium of this invention.

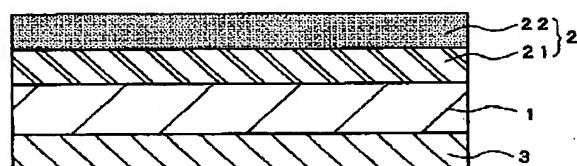
[Description of Notations]

1 Base Material

2 Fluorescence Ink Layer

[Drawing 1]

- 1 基材  
2 熱転写インク層

[Drawing 2][Drawing 3]